

ASTECC



OPERATION AND SERVICE MANUAL

ASTEC Burner Group

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Introduction

Operation and Service Statement

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of ASTEC Burner Systems Group equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, or variations may preclude covering every possibility. If there is any information that is unclear, contradictory, or absent from this manual, please contact ASTEC Burner Group for clarification before proceeding.

Scope of this Manual

The objectives of this manual are to document the installation, operation, and maintenance of ASTEC Burner Systems Group equipment. It provides policies, procedures and references for assuring and controlling quality and compliance to requirements.

Danger Safety and Warnings

DANGER Combustion Equipment

Operating this Burner outside its design parameters, and/or removing, disabling, or bypassing any Whisper Jet safety device can cause an explosion, serious injury, or death.

Basic Safety instructions

1. Always lockout power to any plant equipment before working on it.
2. Equipment that is de-energized can still retain residual energy, or may be susceptible to gravity or other potential energy sources.
3. Keep away from power driven parts, even if they are not moving, unless they are locked out or chained down.
4. Use extreme caution if you must approach running equipment.
5. Check that all fuel sources are shut off, and locked out prior to working on the burner.
6. All the drive guards, handrails, and other safety devices must be in place before starting the equipment.
7. Prior to start up check that all plant components are in good working condition.
8. Never remove, disable, defeat, or bypass any safety device on this equipment.
9. Make no modifications to your Whisper Jet Burner without the recommendation or approval of a representative of ASTEC Burner Group, Engineering, or Service Departments.
10. Account for all your personnel, on the jobsite, before plant startup.
11. Avoid wearing loose clothing, long hair, necklaces, neckties, or anything that could become entangled in rotating machinery.
12. Never leave the control house unattended, while the plant is in operation.
13. To avoid engulfment by loose aggregate, never walk on the material stockpiles, or on the material in the cold feed bins.
14. Never enter a potentially hazardous enclosed space, without an OSHA enclosed space permit program in effect. (Contact ASTEC Parts Department for an outline of these requirements.)
15. Relieve internal pressure before working on any equipment containing high pressure.
16. Carefully vent any flammable gas using safety measures that will prevent ignition.
17. Thoroughly tighten all fittings before reapplying pressure.



How to Recognize Shock

Shock is caused by a rapid loss of blood pressure, the symptoms include:

- A rapid and weak pulse.
- Rapid breathing.
- A feeling of tiredness, or sleepiness.
- Confused thinking.
- Pale, cold, and sweaty skin.

First aid for shock:

- Have the victim lie down, and remain quiet.
- Elevate the victim's feet, to improve circulation to the head and chest.
- Cover the victim with a blanket to maintain body temperature.
- Transport the victim to a hospital, medical clinic, or doctor's office as soon as possible.

WARNING!

Carefully read the safety instructions in this operating and service manual. Follow all the safety warning messages located throughout this manual.

- Always lock-out power before working on any plant equipment.
- To prevent serious bodily injury, do not operate any plant equipment with the guards or other safety components removed.
- Never repair this burner with replacement parts not approved by the manufacturer. (Approved parts are only those available through ASTEC parts department, or any other parts specifically approved by the ASTEC Burner Systems Group.)
- These instructions are intended for use only by experienced and qualified personnel. (Qualified personnel are those trained by ASTEC Burner Systems Group, or ASTEC's Service Department.)

General Burner Information

The WHISPER JET burner is designed to provide maximum firing capability with minimum noise and pollution.

With its compact flame shape, the Whisper Jet flame provides the ideal means for drying aggregate. The flame shape is pre-set at the factory for the most efficient profile for your drum and burner configuration.

The WHISPER JET Burner is a sealed-in Combustion System that provides all the necessary combustion air. This ensures that the combustion air, plus 20% excess air, is available for efficient operation at maximum capacities.

The Fuel/Air ratio is maintained throughout the burner's operating range with either mechanically or electronically linked valves. The WHISPER JET will burn all commercial grades of fuel oil and natural gas, depending on your configuration.

The burner provides a nominal 7:1 turndown from its maximum firing rate. This provides efficient operation at various production rates. In most cases the available turndown is much higher.



Receiving and Inspection

Upon receipt of the Burner:

1. Check each item on the bill of lading and/or invoice to determine that all the equipment that was shipped has been received.
2. Carefully examine all of the equipment, assemblies and subassemblies to check if there has been any damage in shipment.
3. If there are any damaged or missing parts, contact ASTEC Burner Systems Group for assistance. (423-867-4210, or FAX 423-827-1560)

NOTE:

If the installation is delayed and the equipment is to be stored outside:

1. Provide adequate protection, as dictated by your climate and the period of exposure.
2. Special care should be given to all; motors, hydraulics, electrical parts, and bearings, to protect them from rain, snow, or excessive moisture.

Burner Capacity

BURNER MODEL	AIR FLOW SCFH	AIR FLOW SCFM	BURNER BLOWER HP	NATURAL GAS SCFH	OIL FLOW GPM	MAXIMUM CAPACITY BTU/HOUR
WJ-50	660,000	11,000	60	55,000	6.5	55,000,000
WJ-75	990,000	16,500	75	83,000	9.7	82,500,000
WJ-100	1,320,000	22,000	100	110,000	12.9	110,000,000
WJ-125	1,650,000	27,500	125	137,000	16.1	137,500,000
WJ-150	1,900,000	33,000	150	165,000	19.4	165,000,000

Table - 1 Burner Capacities

Notes: For Table-1

1. The maximum BTU/hour rating is based on 20% excess air.
2. The figures used in Table – 1 are based on: 60Hz AC, and Standard Cubic Feet per Hour (SCFH), at 70F air temperature, at sea level.
3. Correction factors must be applied for altitude or temperature variations. (See Altitude Correction Chart.)
4. Viscosity of the oil delivered to the burner at 220°F must be 80 SSU (maximum) or lower.
5. During oil firing, the air to atomize the fuel is provided by compressed air.
6. The system exhaust fan must have enough capacity to provide a slight negative pressure (0.20" to 0.30" water column) at the burner breech plate. (This will exhaust the products of combustion, and prevent "puffing" at the breeching plate.)
7. The air flow in the WHISPER JET can be monitored using the pressure tap in front of the damper. (The body pressure for a given flow is in the individual burner capacity tables.)
8. Gas burners are supplied with a metering orifice plate. This creates a differential pressure at a given flow rate measured in inches of water column with a differential pressure gauge, or manometer.
9. The values of differential pressure versus flow are listed in the individual burner capacity sheets. See Detailed Burner Performance Sheets.



Combustion Flighting

1. The flight design in the combustion zone of the drum is especially important for minimizing flue gas pollutant emissions.
2. The flights provide heat shielding to keep the drum skin temperature low. (Protecting the metal drum skin from the flame radiating directly onto the drum.)
3. For the lowest possible emissions of CO and Total Hydrocarbons, the combustion zone must be clear of veiling material. (Showering material through the flame is a common cause of incomplete combustion.)
4. The combustion zone must be large enough to accommodate complete combustion. (The length and diameter of the combustion zone must be large enough for the burner flame to fit inside. See the Burner Performance Data Sheets for the flame dimensions.)
5. The combustion flights are designed to be self-cooling, to prevent their failure through overheating. (A good combustion flight design plows most of the material over the flights, while allowing some to flow under them next to the shell, insulating the drum from radiant heat, and using the aggregate to cool the flights.)
6. The ASTEC Parts Department can supply combustion flights designed for your application.

Operation

1. The basic model WHISPER JET uses a firing rate control motor mounted to the combustion air damper which is mechanically linked to the fuel valves and air damper.
2. The Programmable Logic Control (PLC) option to the burner control, adds additional sophistication to the management of the fuel/air ratio, by adding another control motor that manipulates the fuel valve position.
3. The PLC allows the fuel and air valve to be controlled independently.
4. A combustion blower pressure switch (normally open) must be made to prove the blower is operating. This pressure switch is usually set at 1.5" w.c.
5. The combustion air control damper must open to initiate the purge cycle prior to lighting the burner.
 - a. The safety limit parameters must be satisfied.
 - b. The purge pressure switch must be tripped for the purge cycle to begin. This pressure switch is usually set at 15" w.c.
 - c. The plant flue gas exhaust fan must be confirmed to be running.
 - d. The fan damper must be open enough for the calculated volume of air to flow during the required purge time.
 - e. The minimum purge time is the time required for four volumes of air to flow through the heating chamber
5. Before light-off the combustion air damper must be at the low-fire position.
6. The low-fire combustion air damper limit switch is set to close its contacts at the minimum fire light off position.
7. The low fire proof fuel valve limit switch (the switch that contacts the fuel valve linkage arm) must be closed with the low fire combustion air switch for the light-off sequence to begin

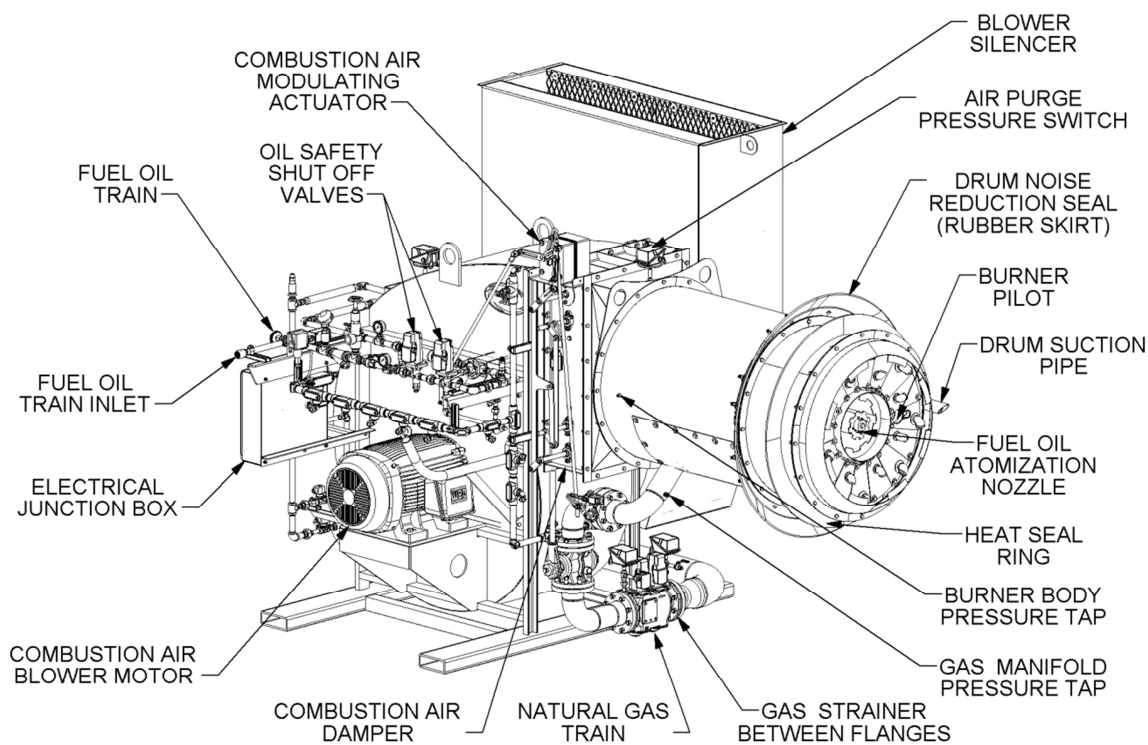


Illustration 1a – Component Identification and Location

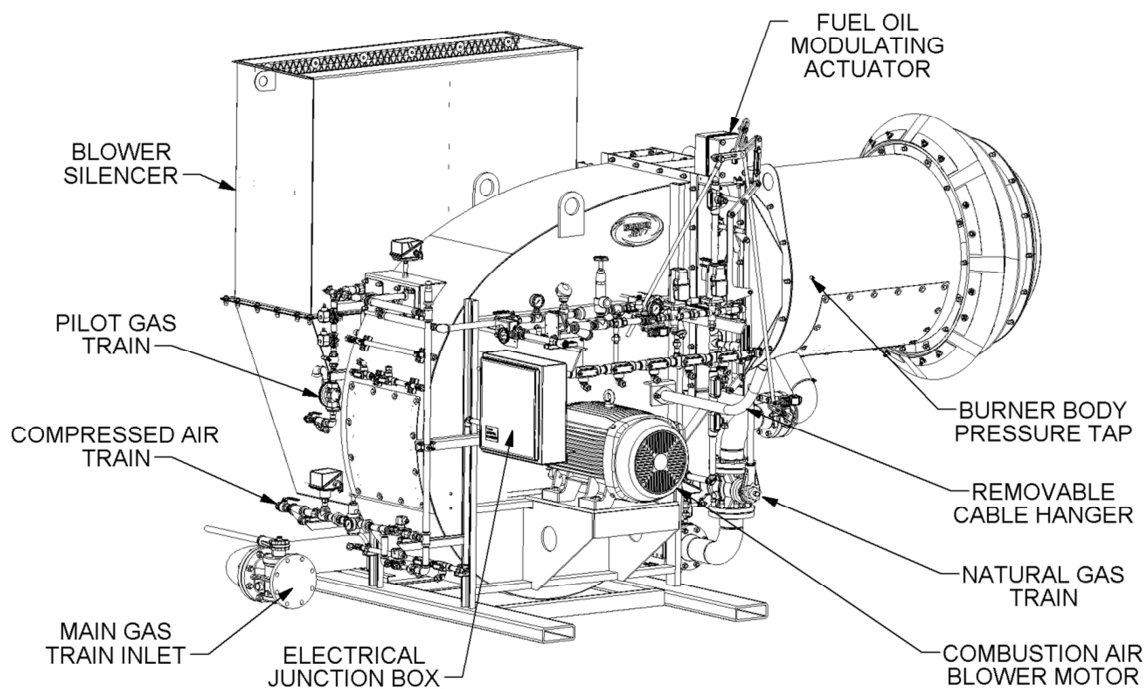


Illustration 1b – Component Identification and Location

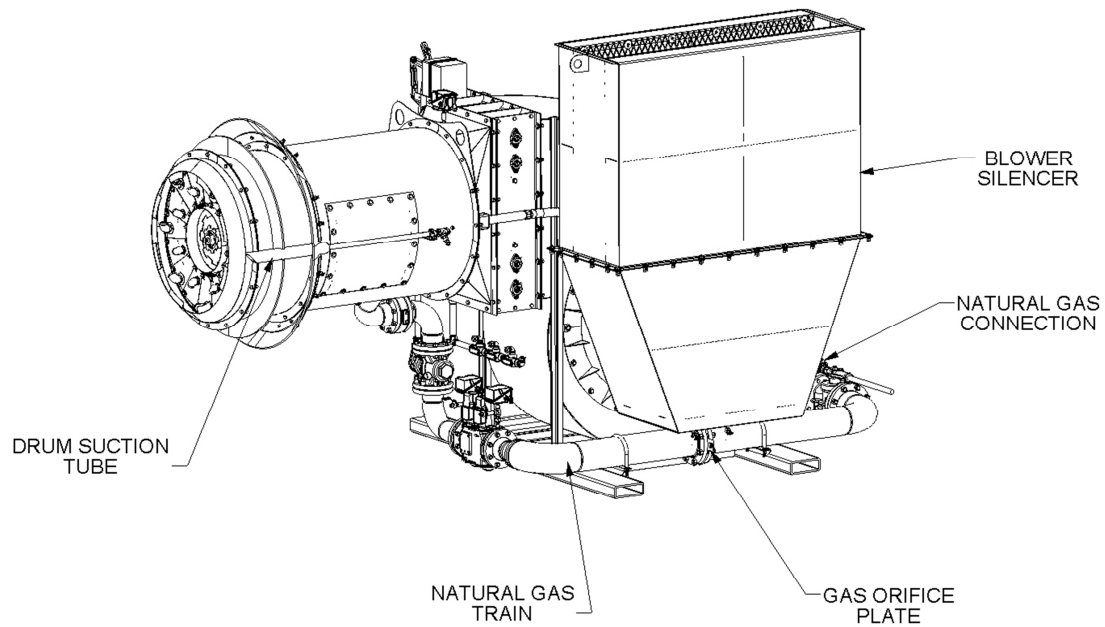


Illustration 1c – Component Identification and Location

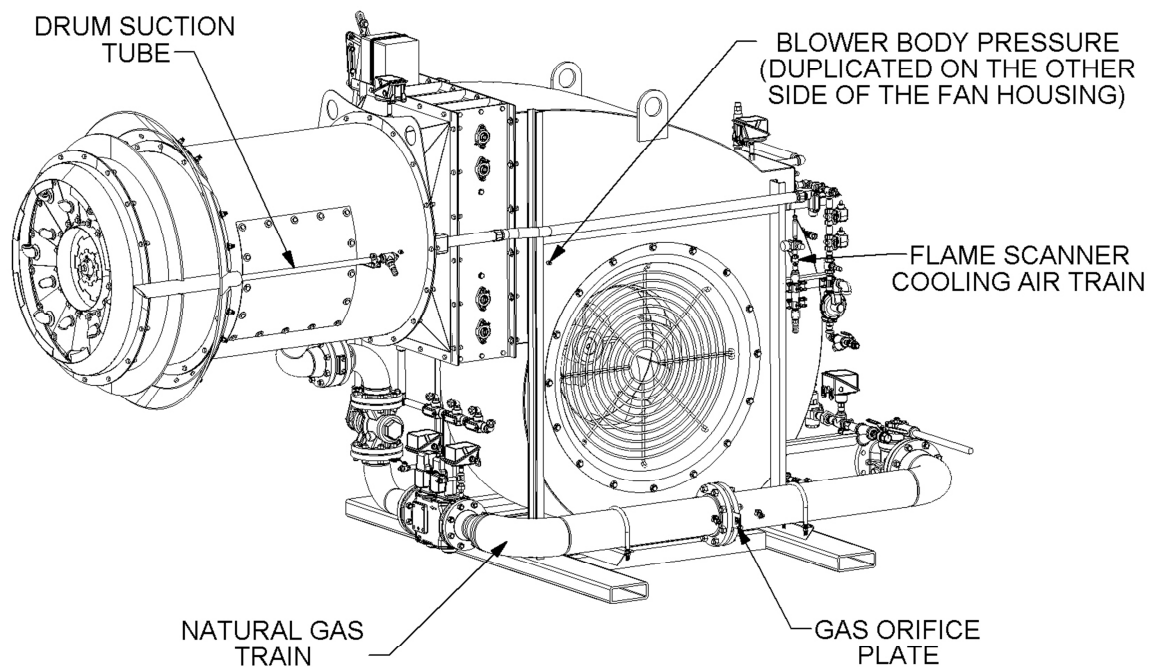


Illustration 1d – Component Identification and Location



Adjustments

WARNING!

Because all combustion systems are inherently dangerous only qualified and experienced personnel should attempt to start-up and adjust PHOENIX burner systems.

Qualified personnel are defined as those trained by the ASTEC Burner Systems Group, or ASTEC Service Department.

Experienced personnel are defined as those who have previously fired an ASTEC WHISPER JET Burner, under the supervision of the ASTEC Burner Systems Group, or ASTEC Service Department.

NOTE:

The fuel valves, air valves, and burner spin vanes are pre-set at the factory to simplify burner and process set-up. **However some adjustment or at least verification for operation is required.**

1. See the complete Burner Performance Data Sheets for flows, operating pressures, and valve positions. Data sheets are located inside the burner junction box. If data sheets are missing contact ASTC Burner Group for a copy.
2. Set the fuel pressure at the entrance of the burner fuel train and the atomizing (compressed) air pressure at the pressure listed on the Burner Performance Data Sheets.
3. Check the linkage settings to make sure they comply with the Burner Performance Data Sheets. Adjust them if necessary.
4. Check the flue gas readings for O₂ and CO. On a DOUBLE BARREL™ drum where there are minimal amounts of air leaking into the exhaust system, a typical O₂ level in the exhaust stack is 10 TO 12% depending on the firing rate.
5. Altering the fuel / air ratio of the burner requires a qualified burner technician to prevent a dangerous rich condition.
6. The best way to alter the fuel / air ratio is to change the fuel pressure slightly, or if a PLC burner control with two control motors is used either the fuel and air motors can be adjusted. If these methods are not satisfactory then slightly adjust the valve settings using the linkage.
7. The spin vanes affect the flame shape and mixing. They are preset at the factory at an initial adjustment that is optimal for most situations. (See Flame Shape Adjustments)
8. For most drums, the spin vanes should not need be adjusted. If adjustment is required it must be done by a qualified burner technician.

NOTE:

Take the flue gas measurements, during the adjustment process, to verify complete combustion.

Burner Dimensions

WHISPER JET dimension drawings are located in the burner junction panel. If the drawings cannot be located please contact Astec Burner Group.



Burner Mounting

1. The centerline of the Burner should be mounted on the centerline of the drum, at the same pitch as the drum.
2. Refer to the drawings located in burner junction panel for burner weight and dimensions.
3. For stationary breeching plates (i.e. not Double Barrel Drums) the burner comes with a split mounting flange that can be bolted onto the drum breeching plate and welded to the burner nose.
4. The mounting flange allows the positioning of the burner at the correct insertion depth past the breeching plate.
5. The insertion depth should be determined by the ASTEC Engineering Department at the time the order is placed.
6. Cut out a hole in the breeching plate 2" larger in diameter than the burner nose flange.
7. Check burner blower rotation. Rotation should be clockwise from the motor end.

Burner Pilot System

The WHISPER JET incorporates a forced-air pilot system. The Pilot and the main flame are monitored by a single Ultra Violet (UV) flame detector attached to the burner, and included in the complete burner package. The air for the pilot is provided from inside the fan housing where there is a constant air pressure. The adjustment and operation of the pilot system is detailed below.

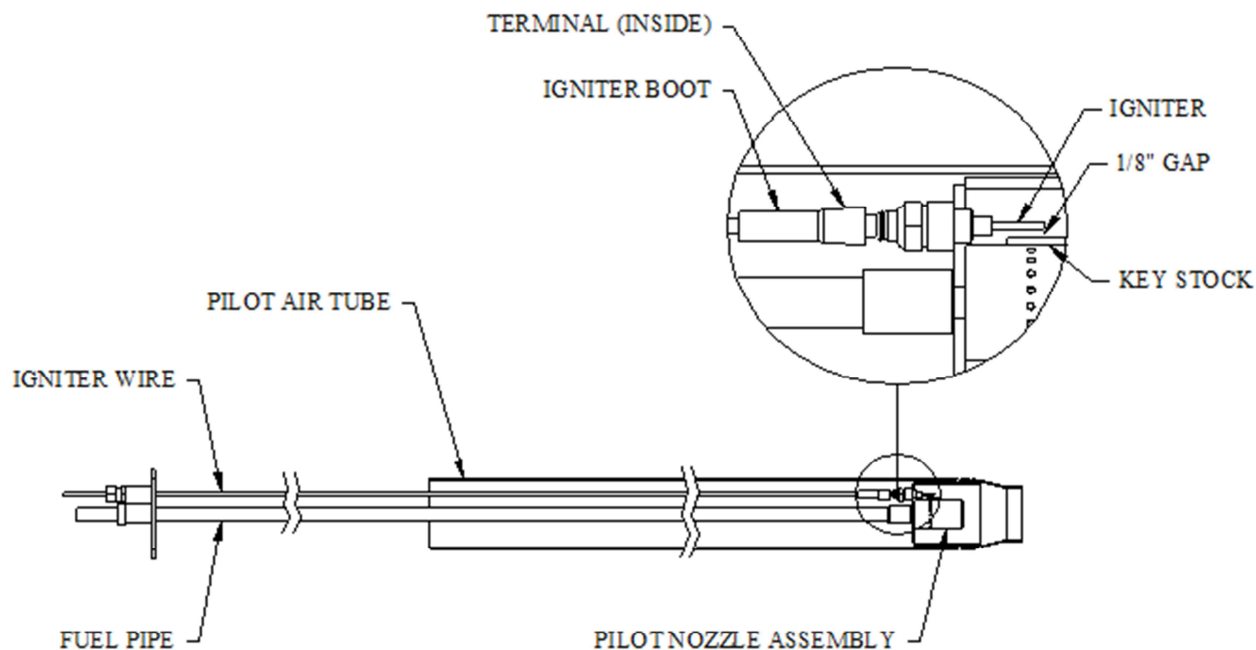


Illustration 2 - Pilot System

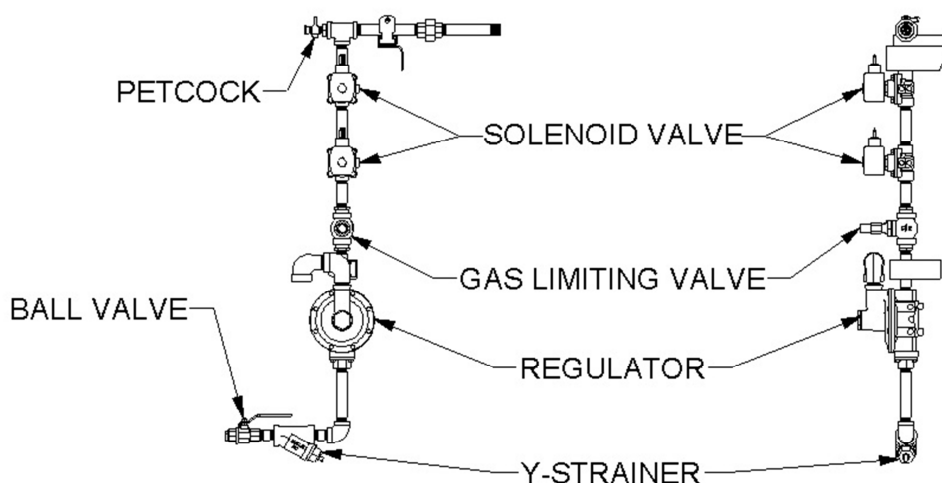


Illustration 3 – Typical Pilot Gas Train

Adjustment and Operation of the Pilot System

1. Use Natural Gas (NG) or Liquid Propane (LP) vapor only to fuel the pilot.

WARNING!

Never connect the LP fuel line to the pilot from the bottom of the LP tank. LP would likely be sent to the pilot, where it could quickly boil off, causing either an explosion or fire in the burner.

2. If natural gas is the primary fuel, the pilot fuel supply should be connected to the natural gas feed piping, upstream of the main regulator.
3. If you will be firing using liquid fuels, and/or natural gas service is not currently available, connect the gas feed piping to a LP vapor line. (See above warning.)
4. Purge the fuel piping of any contaminants before connecting it to the pilot assembly.
5. Size the pilot gas supply line to avoid an excessive pressure drop. (For a pilot gas supply line up to 50 feet long, use a minimum of 3/8" pipe.)
6. Gas pressures at the inlet of the gas pilot manifold can range from 2 to 40 psig.
7. The entire pilot/oil gun assembly can be removed from the burner by removing the bolts on flange at the back of the burner, then pulling the assembly backwards.
8. Remove the spark plug wire boot, then the spark plug can be removed with a standard spark plug socket.



The Initial Pilot Adjustment

1. Make sure the spark igniter is connected to the ignition transformer.
2. Remove the protective cover on the adjustable pilot gas orifice; rotate the adjustment screw clockwise for less gas pressure, Turn counter-clockwise to increase the gas pressure.
3. The initial recommended pressure setting is approximately 1" Water Column for Vaporized Propane, 2" Water Column for Natural Gas measured at the test port.
4. At this rate the pilot should light the main burner easily, and deliver a sufficient UV flame signal.

WARNING!

- The pilot ignition transformer can cause a painful shock, use care around the ignition cable.
- Only leave the pilot gas on for a very short period of time while lighting the burner.
- If pilot does not light at once, shut it off, and then purge it before attempting to relight.



Natural Gas Fuel Piping System

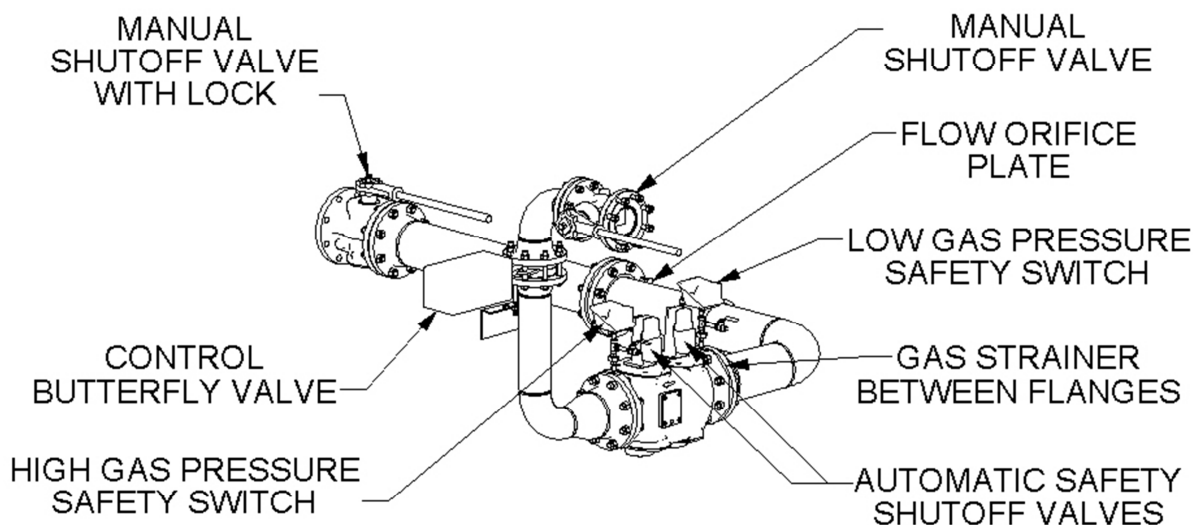


Illustration 4 - Gas Train Components

1. Install a controlling gas regulator in the main gas line within 25 feet of the burner.
 - a. This regulator should be sized to provide the required gas flow at the inlet of the burner manifold.
 - b. 4 – 8.5 is the nominal expected gas pressure required at the burner. Consult the burner profile sheet found in the burner junction panel for more precise information. (See Detailed Burner Performance Sheets)
 - c. Exact gas pressure must be set at the initial start-up depending on piping configuration, burner size, and maximum capacity desired.
2. The piping from the gas regulator outlet to the burner gas manifold should be sized to minimize pressure losses.
3. The pipe size from the control regulator to the gas train, can be identical to the gas pipe size at the entrance to the burner gas train, see tables below.

NOTE:

It is normal for the regulator size to be smaller than the line size.

NOTE:

If the Gas run is more than 25', use the connection size on the burner shown in Table 2 below.

FEED PIPE SIZE, FOR GAS RUNS OVER 25 FEET					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
Pipe Size (Minimum Dia.)	4"	6"	6"	6"	8"

Table 2 - Feed Pipe Size, for Gas Runs Over 25 Feet

NOTE:

If the Gas run is 25 feet or less. use the connection size on the burner shown in Table-3 below.

FEED PIPE SIZE, FOR GAS RUNS 25 FEET OR UNDER					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
Pipe Size (Minimum Dia.)	4"	4"	4"	6"	6"

Table 3 - Feed Pipe Size, for Gas Runs 25 Feet or Under



4. The supplied manual shutoff valve, must be installed upstream of the gas control regulator.
 - a. The strainer protects the valves from destructive dirt that could lodge in them.
 - b. Shutoff valve facilitates servicing of the gas train.
 - c. The Siemens gas valves have an integral strainer at the inlet of the first valve.
5. The gas company should purge the main gas line for scale and dirt before it is attached to the burner gas manifold.

NOTE:

Install the flexible fitting supplied with the burner gas manifold to reduce flexing of the manifold produced by plant vibrations.

ASTEC PART NUMBERS, FLEXIBLE PIPE NIPPLES					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
ASTEC Part Number	076046	048292	048292	048292	048292

Table 4 - Recommended Pipe Nipple

NOTE:

The low and high gas pressure switches should be set just above and below the safe operating range of gas inlet pressures respectively. This should be individually determined on each installation. Typically this would be 50% of the running pressure for the low gas pressure switch and 125% of the operating pressure for the high gas pressure switch.

NATURAL GAS REGULATOR REQUIREMENTS					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
Maximum Capacity	55,000 Cu Ft/Hr	82,500 Cu Ft/Hr	110,000 Cu Ft/Hr	137,500 Cu Ft/Hr	165,000 Cu Ft/Hr
Gas Inlet Pressure	5.1 PSI	6.8 PSI	5.8 PSI	8.5 PSI	6.1 PSI
Gas Inlet Pipe Size	4"	6"	6"	6"	8"

Table 5 - Natural Gas Regulators

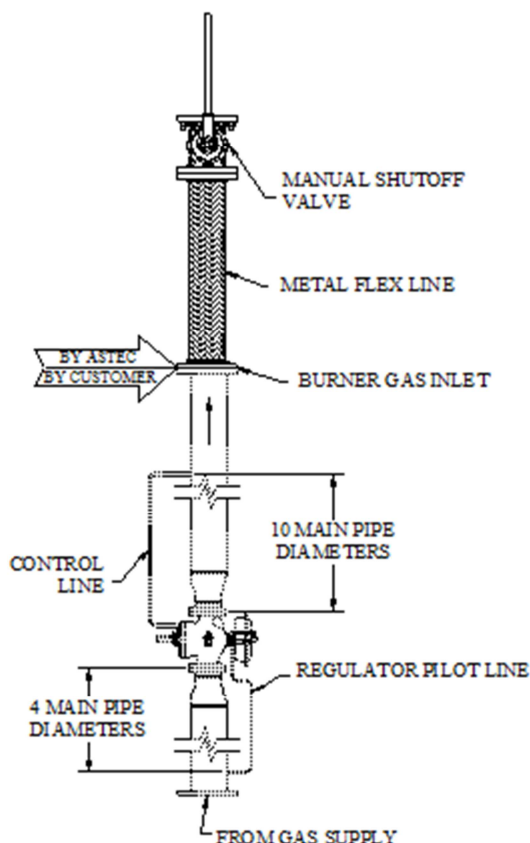


Illustration 5 - Regulator Requirements

6. The gas valve linkage must be adjusted for proper flow control..
7. See individual burner performance sheets for air and gas flows. (See Detailed Burner Performance Sheets)
8. Use the utmost care in making any adjustment to prevent an unsafe condition.

WARNING!

- The settings in Table 5 are for the initial set-up only.
 - Final settings will have to be adjusted for the particular operating conditions.
 - Be sure not to have more fuel flow than there is combustion air available to burn, or "puffing", and a dangerously rich firing condition could occur.
9. Metering natural gas is accomplished by taking a differential pressure across the orifice plate in the pre-piped gas train.
 - The gas flows are shown in the Detailed Burner Performance Sheets.
 - To find the actual gas flow; take the square root of the measured differential pressure, then multiply it by the flow shown in *Table 6*.
 - For example with 3"WC differential pressure on the WJ 100, Gas Flow = $\sqrt{3}$ times 30,000 = 52,000 SCFH (Standard Cubic Feet per Hour)



NATURAL GAS ORIFICE METER SIZE					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
Flow SCFH natural gas at 1" WC Differential Pressure with 5 PSI static	15,000	30,000	30,000	30,000	51,000
Gas Inlet Inside Diameter	3"	4.6"	4.6"	4.6"	6"
Gas Inlet Pipe Size	4"	6"	6"	6"	8"

Table 6 - Natural Gas Orifice Meter Sizes

Oil Fuel Piping System

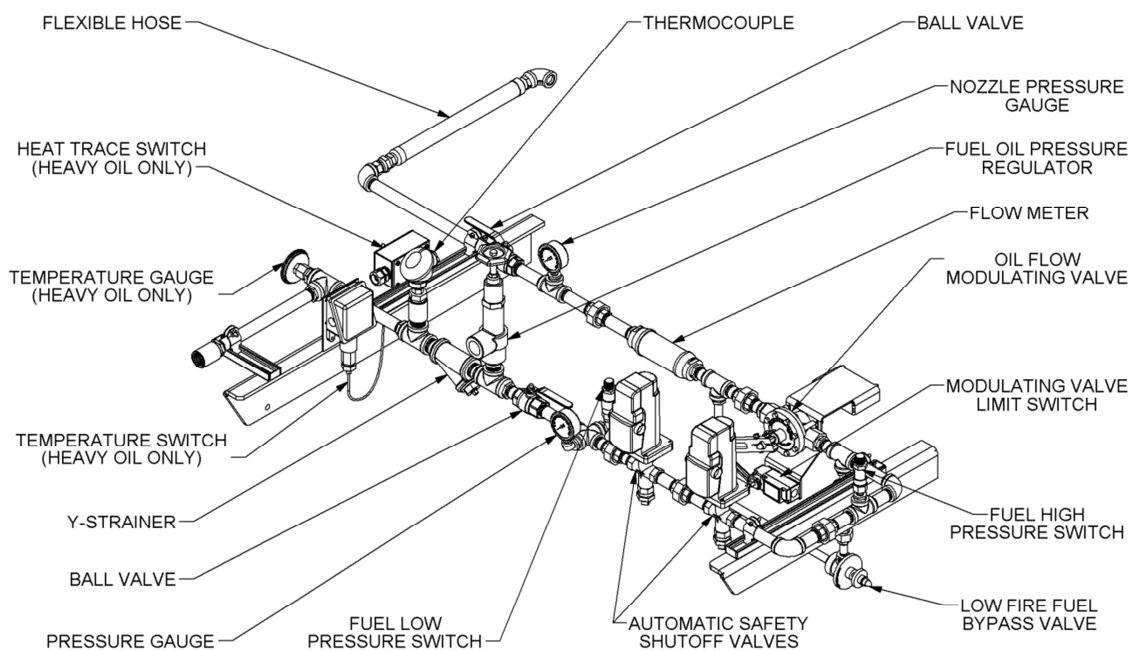


Illustration 6 - Oil Train (Heavy Oil Shown)



OIL TRAIN SETTINGS					
Burner Model	WJ-50	WJ-75	WJ-100	WJ-125	WJ-150
Maximum Capacity	6.5 GPM	9.7 GPM	12.9 GPM	16.1 GPM	-
LF Oil Inlet Pressure	92 PSI	132 PSI	116 PSI	130 PSI	-

Table 8 – Oil Train Settings

OIL LINE SIZES									
Burner Model	Discharge Line In Feet,			Return Line In Feet, Light Oil (Up to 100 SSU)			Return Line In Feet, Heavy Oil (Over 100 SSU)		
	0' to 25'	25' to 49'	50' to 100'	0' to 25'	25' to 49'	50' to 100'	0' to 25'	25' to 49'	50' to 100'
WJ-50	1"	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/2"
WJ-75	1"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	2"
WJ-100	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	2"
WJ-125	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	2"	2"
WJ-150	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/2"	1-1/2"	2"	2"

Table 9 – Minimum Oil Line Size for various lengths

1. For recommended pipe sizes, see Table 9.
2. Before attaching the fuel lines, purge the piping to remove scale, dirt, and other contaminants that could clog and damage the fuel system.
3. Adjust the pressure control valve until the required oil pressure is achieved. (See the Individual Burner Performance Data Sheets for the approximate settings.)
4. Depending on the system design, the final pump pressure will have to be adjusted to attain the desired burner output.
5. The low oil pressure switch is factory set at 30 PSIG.
6. The low oil pressure switch should be set about 10 PSIG lower than the actual pressure required
7. Leak test the piping before start-up, then check for leaks daily.
8. The manual low fire bypass oil control valve is used to set and maintain the low fire oil flow at the burner. (See the Individual Burner Performance Data Sheets for the low fire oil setting.)
9. The burner oil flow (metering) control valve range is usually set from position 0 to Position 12.
10. The high fire oil flow can be set by varying the fuel pressure, or by changing the valve profile in the control system. (See the Individual Burner Performance Data Sheets for proper fuel flows.)
11. Oil flow rates can be checked with the inline oil flow meter in the fuel control valve train.
12. Oil flow rates can be confirmed using the nozzle pressure and the burner performance data sheet.

WARNING!

- The settings are for the initial set-up only.
- Final settings will have to be adjusted for the particular operating conditions.
- Be sure not to have more fuel flow than there is combustion air available to burn or "puffing", and a dangerously rich firing condition could occur.



Heavy Oil Fuel Piping System

WARNING!

Be very careful with Heavy oil:

- Heavy oil has to be heated to lower its viscosity for proper atomization.
- Do not heat the Heavy oil higher than its vapor point, to avoid fire.
- Contact with the hot oil, or piping, can cause a severe burns.

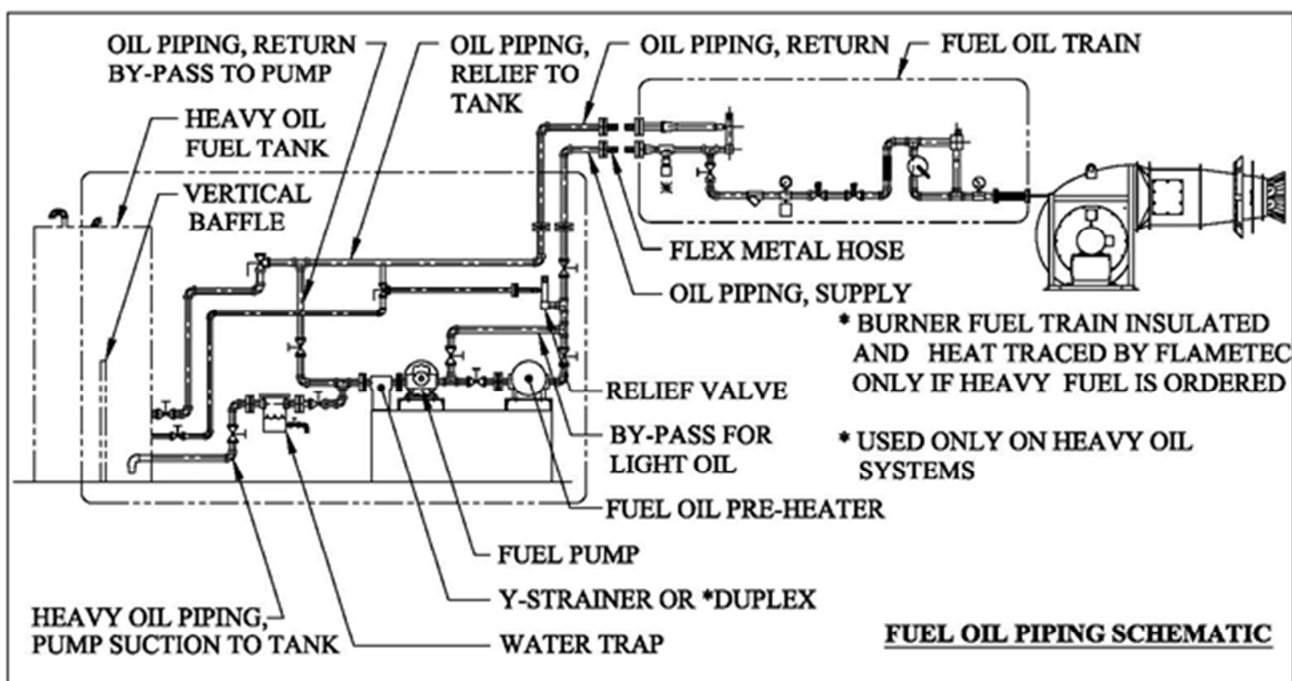


Illustration 7 - Heavy Oil Piping Schematic

1. For recommended pipe size see Table 9.
2. Your burner should fire on all commercially available heavy oils.
3. Proper fuel viscosity is required for satisfactory atomization and combustion of heavy oil.
 - a. The viscosity of the oil must be 80 SSU (Saybolt Seconds Universal), or lower.
 - b. Use the included Viscometer, (ships in 5 gallon bucket with burner), or other suitable device to determine the proper oil temperature to achieve this viscosity.

NOTE: Every shipment of oil must be individually tested.

- c. Check the fuel specifications to check the vapor point of the fuel.
- d. For better combustion the viscosity can be lower than the 80 SSU maximum, which means a higher oil temperature.
- e. Never heat the oil above 220° F or 10° F below the vapor point of the fuel, whichever is lower.
- f. The oil temperature switch must be adjusted to the minimum temperature for good atomization for the particular oil being used.
- g. Make sure the fuel is not forming vapor (steam) pockets in the oil lines.
- h. These vapor pockets can cause the pump to cavitate, causing damage to it.
- i. Vapor pockets can also interrupt fuel flow causing the burner to falter.
- j. They can even cause pipes to burst causing damage and possible injury.



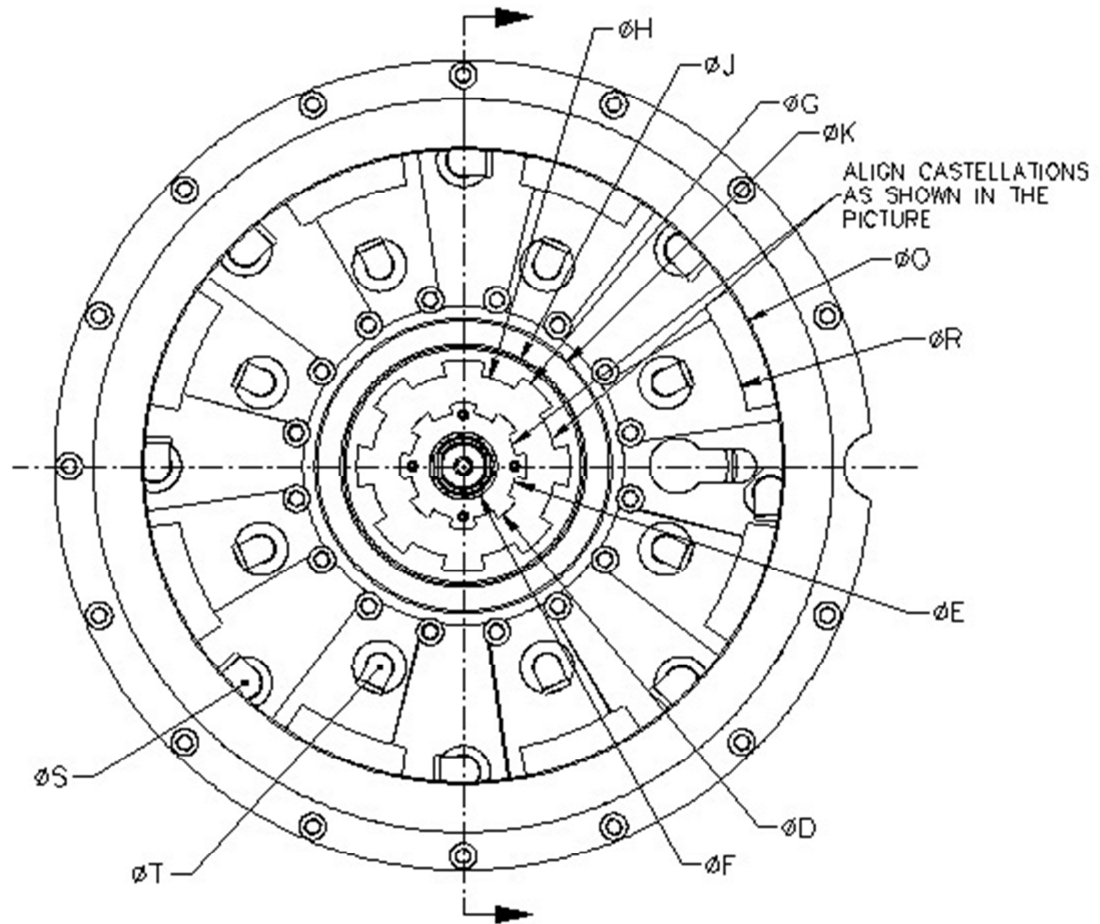
- k. Set the oil heater temperature regulator, and the indicating low oil temperature switch (located on the burner's oil manifold) to the temperature determined in item 2b above.
- l. This will prevent the burner from operating when the oil is too thick to be atomized and burn well, and will prevent damage to your plant.
3. Purge the lines before attaching them to the fuel manifold.
4. Adjust the pressure relief valve until the required oil pressure is attained.
5. See the individual burner performance sheets for approximate valve settings. (See Burner Performance Data Sheets for proper fuel flows.)
6. Final pump pressure will have to be adjusted to attain desired burner output, depending on system design.
7. High fire oil flow can be set by adjusting fuel pressure or by restroking the oil valve. Refer to individual burner performance sheets. (See Burner Performance Data Sheets)
8. The manual low fire bypass oil control valve is used to set and maintain the low fire oil flow at the burner. Refer to individual burner performance sheets. (See Burner Performance Data Sheets)
9. The low oil pressure switch is factory set at 30 PSIG, Set according to local code requirements.

WARNING!

- These settings are for the initial set-up only.
- Final settings will have to be adjusted for the particular operating conditions.
- Be sure not to have more fuel flow than there is combustion air available, or "puffing" and a dangerously rich firing condition could occur.



Fuel Oil Atomizer



BURNER	A	B	C	ØD	ØE	ØF	ØG	ØH	ØJ	ØK	L*	M	N	P	ØQ	ØR	ØS	ØT	U
	OIL NOZZLE	ATOMIZING AIR TUBE	SEC. AIR CHOKE	ATOMIZING AIR CASTILATED RING OUTER DIA.	ATOMIZING AIR CASTILATED RING INNER DIA.	ATIMIZING AIR CHOKE RING I.D	SECONDARY AIR CHOKE RING OUTER DIA.	SECONDARY AIR CHOKE RING INNSER DIA	SEC. AIR RING I.D	CONTROL RING I.D	NUMBER OF SEC. GAS PIPES	OUTER VANE ANGLE	SEC. VANE ANGLE	OUTER AIR GAP	OUTER CONE I.D.	OUTER CASTALLATION I.D.	OUTER GAS ELBOW	STABIUZZING GAS ELBOW	OIL NOZZL
WJ-50	7/8"	1-7/8"	3"	Ø5-1/4"	Ø4-1/4"	Ø2-5/8"	Ø10-15/16"	Ø9-1/2"	Ø14"	--	2	45°	45°	1/2"	Ø25"	Ø22"	1/2"	--	1/2"
WJ-75	3/4"	1-7/8"	4-1/2"	Ø6-1/2"	Ø5-15/32"	Ø3-1/2"	Ø10-15/16"	Ø9-1/2"	Ø12-3/8"	Ø14"	2	55°	45°	1/2"	Ø32-3/4"	Ø29-3/4"	1/2"	1/2"	1/2"
WJ-100	3/4"	1-7/8"	3"	Ø6-1/2"	Ø5-15/32"	Ø3-1/2"	Ø14-1/4"	Ø12-3/4"	Ø15"	--	2	55°	45°	1"	Ø33"	Ø29-3/4"	1"	3/4"	1/2"
WJ-125	3/4"	1-1/2"	3"	Ø6-1/2"	Ø5-15/32"	Ø4-1/4"	Ø14-1/4"	Ø12-3/4"	Ø15"	--	4	55°	45°	1-1/4"	Ø33"	Ø29-3/4"	1"	1"	1/2"
WJ-150	1/2"	2-3/8"	3-1/2"	Ø9"	--	Ø5-1/2"	--	Ø14-1/2"	Ø16-1/2"	--	4	55°	45°	1-1/2"	Ø37"	Ø33-13/16"	1"	1"	1"

Illustration 8a - Nozzle Settings

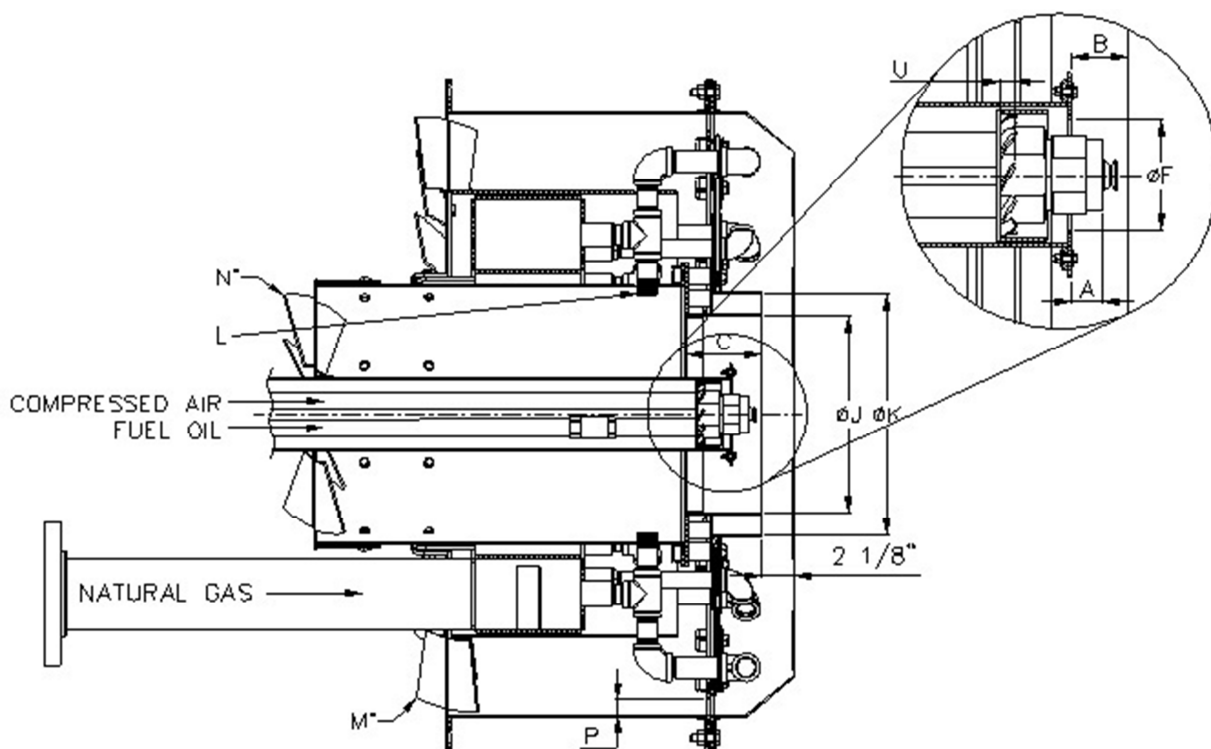


Illustration 8b - Nozzle Settings

The position of the fuel oil atomizer in the nozzle affects its ability to atomize the oil. The nozzle is preset at the factory as shown in Illustration 8b. In case of variation, changing the oil atomizer nozzle position is accomplished by the following.

To Reset the Nozzle Position, use the following steps:

1. Shut down the burner, and de-energize the burner compressed air system.

WARNING:

Lock-out the plant power, before working on the burner.

2. Shut off the manual oil ball valve on the burner oil train.
3. If heated heavy oil is being used, allow enough time for the oil in the piping to cool.
4. Look at Illustration 8b, to determine if the oil atomizing nozzle must be moved in or out to regain the proper adjustment.
5. Make a note of the initial position of the oil nozzle.
6. Loosen the set screws of the set collars on the mounting plate of the Oil Gun/Pilot Assembly.
7. Move the nozzle pipes in or out to effect the required retraction or extension of the Oil Gun/Pilot Assembly.
8. Contact ASTEC Burner Systems Group for any questions about proper positioning.
9. Once the proper positioning of the Oil Gun/Pilot Assembly is completed:
 - a. Re-tighten the set screws of the set collars on the mounting plate of the Oil Gun/Pilot Assembly.
 - b. Install the Oil Atomizer Assembly in the burner/blower with the four nuts.



To Remove the Oil Gun Assembly, use the following steps:

1. Shut down the burner, and de-energize the burner compressed air system.

WARNING:

Lock-out the plant power, before working on the burner.

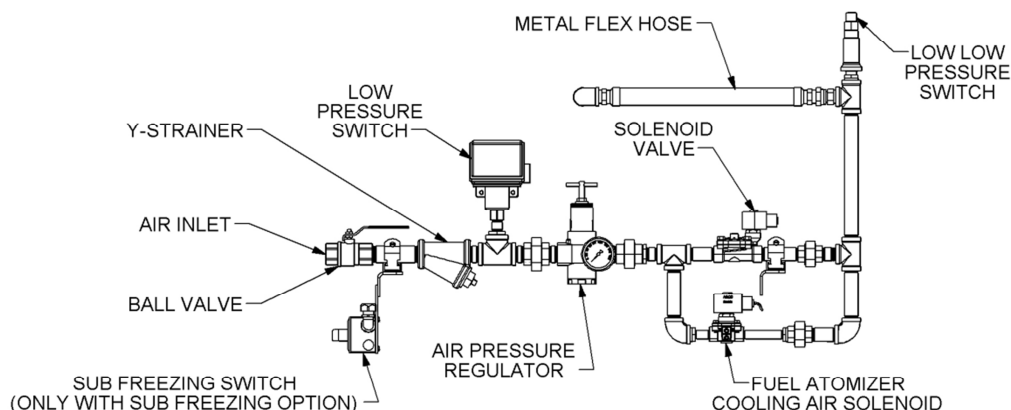
2. Shut off the manual oil ball valve on the burner oil train.
3. If heated heavy oil is being used, allow enough time for the oil in the piping to cool.
4. Remove the four nuts holding the Oil Gun/Pilot Assembly onto the burner/blower.
5. Pull out the Oil Gun/Pilot Assembly from the burner/blower body.
6. Make a note of the initial position of the oil nozzle.
7. Contact ASTEC Burner Systems Group for any questions about proper positioning.
8. Once the proper positioning of the Oil Gun/Pilot Assembly is completed:
 - a. Re-tighten the set screws of the set collars on the mounting plate of the Oil Gun/Pilot Assembly.
 - b. Install the Oil Atomizer Assembly in the burner/blower with the four nuts.

Compressed Air Train

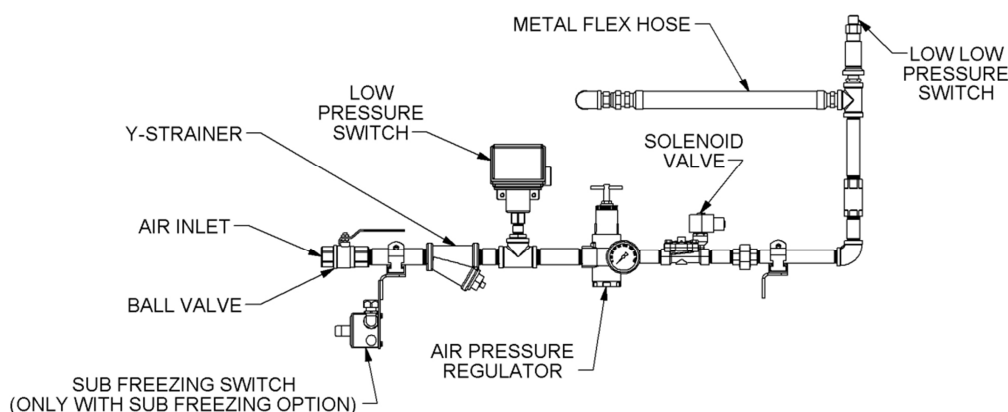
1. The WHISPER JET uses compressed air for atomizing fuel oil.
2. Compressed air is supplied to the inlet of the compressed air train.
3. Size compressed air feed line according to "Recommended Compressed Air Pipe" Table 10. (These sizes will result in minimum pressure drop for proper oil atomization.)
4. See drawing for location of inlet pipe.
5. The compressed air train includes: a manual shutoff valve, "Y" strainer, Low compressed air switch, pressure regulator, pressure gauge, compressed air solenoid and a flexible hose. (See Illustration - 9), this is a general arrangement. Each burner has its own drawings in the burner junction panel. (See Burner Performance Data Sheets.)
6. Adjust the low compressed air pressure switch to just slightly under the recommended air pressure.
7. Compressed air pressure is adjusted by the "tee" handle on top of the pressure regulator.
8. Set the compressed air pressure to the pressure recommended (See Burner Performance Data Sheets.)
9. The low low compressed air switch is factory set at 60 PSIG and is not adjustable. (See Illustration 9)

COMPRESSED AIR PIPE SIZES							
100 PSIG Supply Air Pressure		Length of Compressed Air Line					
		50'	100'	150'	200'	250'	300'
Burner Model	Maximum Air Flow (SCFM)	Pipe Size	Pipe Size	Pipe Size	Pipe Size	Pipe Size	Pipe Size
WJ-50	50	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"
WJ-75	85	3/4"	1"	1"	1"	1"	1"
WJ-100	85	3/4"	1"	1"	1"	1"	1"
WJ-125	120	1"	1"	1"	1"	1-1/4"	1-1/4"
WJ-150	140	1"	1"	1-1/4"	1-1/4"	1-1/4"	1-1/4"

Table 10 – Recommended field pipe size for compressed air at various lengths.



FOR GAS AND OIL BURNERS



FOR OIL ONLY BURNERS

Illustration 9 - Typical Compressed Air Train

WARNING!

- Lock out power prior to working on high pressure piping.
- Relieve pressure in the piping, in the valves, and solenoids, prior to working on the piping.
- Remember that dangerous air pressure can also be trapped between valves or controllers.

Flame Shape Adjustments

1. The WHISPER JET Burner is preset at the factory for the shortest and narrowest flame possible. This makes flame adjustment burners virtually obsolete.
2. The nose spin vanes affect the flame shape and combustion intensity.
3. Do not change the spin vanes from the factory settings. (They are preset at 45° to 60°.)
4. The length of the flame must be shorter than the combustion zone in your drum. (Material that showers through the flame causes increased pollutants in the flue gas.)
5. The width of the flame must be less than the I.D. of the combustion flights.
6. See the detailed Burner Performance Data Sheets for the flame size and diameter. (See Burner Performance Data Sheets.)



Flame Scanner

The WHISPER JET is supplied with a Flame Scanner that detects Ultra Violet (UV) radiation in the flame. The flame scanner is located in an air cooled guide tube near the front of the burner. It can be removed by unthreading the 1 1/4" aluminum cap on the back of the burner and pulling the flexible conduit attached to it out.

NOTE:

Be careful not to physically shock or overheat the Flame Detector as this can cause it to fail.

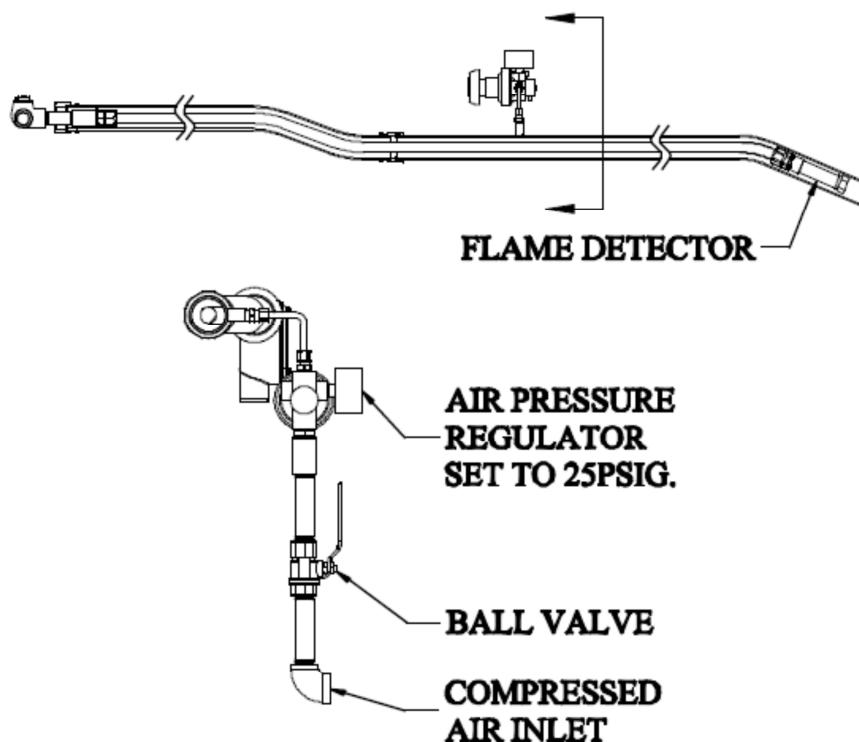


Illustration 10 - Flame Scanner and Cooling Air Train

Pilot and UV Cooling Air

The Pilot and flame scanner require cooling air, at a constant pressure, from the plant compressed air supply to prevent dust buildup in front of the scanner lens. Dust buildup on the scanner lens will degrade accurate flame readings and may cause nuisance shutdowns.



Maintenance & Trouble Shooting Guide

The WHISPER JET Talon burner has minimal internal moving parts and is relatively maintenance free, however there are a few items that for safety reasons and for fuel efficiency should be periodically checked.

Maintenance Schedule

Daily Maintenance

- Clean all oil filters and strainers as needed.
- Check oil temperature and viscosity of waste oil, It must be less than 80 SSU.
- Check fuel pressure.
- Check atomizing air pressure, which should be 65-70PSIG when running.

Weekly Maintenance

- Clean the oil nozzle and atomizer.
- Clean the flame scanner using a soft cloth and Windex.

Monthly Maintenance

- Remove the oil gun assembly from the back of the burner.
- Clean the swirl plate, attached to the back of the nozzle body.
- Clean and inspect the igniter plug and igniter wire.
- Inspect the heat tracing.
- Inspect the burner cone for signs of distortion, or other heat damage.
- Remove any build-up on the burner front.

Yearly Maintenance

- Thoroughly wash and inspect the burner blower impeller. It is accessed through the hatch on the back of the blower.
- Clean the pilot gas Y-strainer.
- Clean the gas screen. It is located at the inlet of the double blocking gas valve.
- Clean the compressed air Y-strainer.
- Check the oil nozzle for signs of wear.
- Check fuel & air piping for leaks and tightness.
- Have combustion quality checked with a combustion analyzer.
- Check and lubricate the air damper bearings.
- Check the function of all safety equipment (pressure switches, limit switches, etc), to make sure they are all fully operational.

Maintenance Notes:

1. Check and lubricate all points of the valve linkage.
2. Mark the linkage so that any slippage will be noticed.
3. Dirt can clog the atomizing air nozzle, as well as causing burner firing problems, it can also waste fuel through poor atomizing.
4. To remove and clean the burner oil tube and nozzle assembly use the procedure from Section M.
5. Check to make sure the atomizing oil nozzle is at the proper position inside the burner. (See *Illustration 8b*)
6. Periodically check the functioning of all safety equipment (pressure switches, limit switches, and solenoids) to make sure they are not clogged with dirt, or in any way inoperative.
7. Frequently, a weak flame signal is caused by dust on the lens of the flame scanner.



Trouble Shooting

Trouble Shooting		
Problem	Cause	Solution
Pilot will not light	No Spark	a. Check to see if the plug has a spark. b. If there is no spark, check the Plug, Cable, and Ignition Transformer. c. Check to see if voltage is going to the Ignition Transformer. d. Check the terminal connection to the Ignition Transformer. e. Check the connection at the back of the Burner. f. Check the connection at the J-Box. g. Remove the Oil Gun/Pilot Assembly; and check the connection to the Plug. h. Inspect the Spark Plug Cable for tears and cuts. i. Check the Spark Plug for carbon build-up. j. Check the Spark Plug Gap.
	No Pilot Gas	a. Check the LP Tank for fuel level. b. Check the Cut-Off Valve position. c. Check for LP gas leakage. d. Check the LP fuel pressure. e. Verify the Pilot Solenoids are opening. and that there is gas flow. f. Check the Pilot Strainer for dirt.
	No Flame Signal	a. Verify the Pilot Solenoids are opening, and that there is gas flow. See "No Pilot Gas" above. b. Pull the Flame Sensor from the Burner, and clean the lens. c. Check the signal from the Flame Sensor; if there is no signal, replace the Flame Scanner. d. If the Pilot is lighting and there is no Flame Signal, replace the Flame Scanner. e. Check the wires to the Flame Relay. f. Then check the Flame Relay, fix or replace as needed.
Main Burner Fuel won't ignite	Fuel flow too low	a. Check the linkage, fuel pressure, and compressed air pressure settings (for oil fired burner only) they may have changed. b. Check the burner set-up sheets for standard settings. c. Check/clean the Strainer and the Y-Filters NOTE: Be careful when increasing the fuel flow not to make the mixture too rich, or the low fire setting could be too high. i This adjustment should be done by qualified personnel. ii Qualified personnel are those trained by ASTEC Service Department.
	Air Damper set too high for low fire	Check air pressure at burner downstream of air damper it should be less than 1" w.c. and air damper should be between 0 and 1.



Trouble Shooting, Continued:		
Problem	Cause	Solution
Flame stability problems on heavy oil	Oil too hot, causing vapor pockets	<p>a. The viscosity of the oil must be no higher than 80 SSU (Saybolt Seconds Universal).</p> <p>b. Use a Viscometer to determine the proper oil temperature to achieve this viscosity.</p> <p>NOTE: Every shipment of oil must be individually tested.</p> <p>c. Check the fuel specifications to verify the vapor point of the fuel</p> <p>d. For better combustion the viscosity can be lower than 80 SSU; which means a higher oil temperature is required.</p> <p>e. Never heat the oil above 10 deg. F below the vapor point of the fuel.</p> <p>f. Make sure the fuel is not forming vapor (steam) pockets in the oil lines.</p> <p>NOTE: The fuel pressure will become erratic, if the lines are vapor locked, or pressure is building.</p> <p>g. Check the Nozzle/Atomizer to see if it is dirty.</p> <p>h. Check the Filters and Strainers to see if they are partially blocked.</p> <p>i. Check the atomizing air pressure to see if it is erratic.</p>
	Or too cold causing poor atomization	
	Atomizer dirty	Pull out the Burner Nozzle, and clean it.
	Poor quality oil	<p>a. Some recycled oil contains non-flammable fluids. Hydraulic fluid, for example, will not burn well or at all.</p> <p>b. Replace the oil, and purge the fuel lines.</p>
High Stack emissions	Too much fuel or too little	To get the best emissions and fuel economy the burner should be set up with 10 to 30% excess air. (See Burner Performance Data Sheets) for settings and confirm with flue gas analysis.
Limits not complete	Pressure switch, or limit switch not energized	<p>a. See the component location drawings for Pressure and Limit Switch location.</p> <p>b. Check the Fuel Pressure Switch.</p> <p>i. Is it energized if not repair or replace it.</p> <p>ii. Is it plugged, if it is clean replace it,</p> <p>c. Check the Limit Switch.</p>
High stack temperature	Too much fuel at low fire	<p>a. Check the fuel flow at low fire, set to recommended flow.</p> <p>b. Check the fuel pressure, set to recommended pressure.</p> <p>c. Check the Low Atomizing Air Pressure, set to recommended pressure.</p>
	Incorrect lighting in the drum	Contact the ASTEC Service, or Engineering Departments, to have ASTEC personnel check the flights.
Oil Build-up on burner	Oil not atomizing correctly	<p>a. Check nozzle for dirt, clean if required.</p> <p>b. Check oil viscosity and temperature.</p> <p>c. Check atomizing oil pressure and flow.</p> <p>d. Check the Pintle, replace if worn.</p> <p>e. Check to see if the Atomizer/Pintle Holding Cup is loose.</p>
	Oil atomizer in incorrect position	<p>a. Check the location of the oil nozzle in the burner.</p> <p>b. If the nozzle is location is too far into the burner, it could cause oil build-up at low fire.</p> <p>c. Check for oil build-up on the burner.</p> <p>NOTE: This does not occur in normal operation (unless the set collars holding it in place loosen, which sometimes occurs due to vibration).</p> <p>d. Reset oil atomizer position to dimensions in Illustration 8.</p> <p>NOTE: The oil nozzle is factory set and does not need to be removed during routine maintenance.</p>



Recommended Spare Parts

WHISPER JET SPARE PARTS LIST (Domestic Burners Only, 120V/60Hz)			
Item	Quantity	ASTEC P/N	Description
1	1	075050	Igniter
2	1	001001	Motor, Barber Colman #EA57 on two control motor burners and WJ50
3	1	063336	Fireye UV Scanner
4	1	075699	Low gas, air pressure switch 30 i.w.c.
5	1	079558	Motor, Barber Colman #EA71 on one control motor burners
6	1	080021	Flame Safeguard Module Fireye YB110UV
7	1	081185	Pilot Solenoid Valve
8	2	005788	Switch limit single pole 3SE03-AR1
9	1	078550	High Pressure Switch Oil 150 PSI
10	1	076926	Low Pressure Switch Oil 30 PSI
11	1	080222	Temperature Switch, 100~350°F (Heavy Oil Only)
12	1	076217	Thermocouple 1/2" NPT 350~1400°F (Heavy Oil Only)

Table 11 – Spare Parts List

WHISPER JET NOZZLE SPARE PARTS LIST				
Burner Model	Nozzle Body ASTEC P/N	Nozzle Cap ASTEC P/N	Nozzle Mixer Light Oil ASTEC P/N	Nozzle Mixer Heavy Oil ASTEC P/N
WJ-50	076715	076205	081496	081497
WJ-75	076003	076005	076004	077818
WJ-100	076003	076005	076004	077818
WJ-125	076010	076012	076011	077819
WJ-150	076010	076017	076016	077821

Table 12 – Nozzle Spare Parts List

Parts Hotline 1-800-251-6042

Hours: Monday thru Friday 7:00 a.m. to 12:00 a.m. midnight, EST

Saturday 8:00 a.m. to Noon EST

Telephone: 423-867-4210 | Fax: 423-867-7609

Email: parts@astecinc.com

Our complete line includes items for many brands and types of plants. From liners and bearings to fabricated assemblies, we've got it all. ASTEC Parts Department is the OEM for Barber-Greene® asphalt plants and is the only OEM for Barber-Greene® asphalt plant replacement parts.

We also supply computerized asphalt plant controls customized to your requirements. And our engineers are available to assist you with facility upgrade design.

ASTEC Parts Department has one of the largest spare parts inventories for hot mix asphalt plants in the world. A new warehouse and shipping facility has expanded the capabilities of this facility even further. Ten in-house parts technicians take your calls and make sure you get the part you need when you need it. If you need next day delivery, we will put that part on a plane and get it to you. If you need a Field Service Technician to come install it, we will send one.

The ASTEC Parts Department runs two shifts daily, from 7:00 am to 12:00 midnight Eastern Standard Time. After 12 midnight and on weekends, our phones are forwarded to an answering service that will have the Astec Parts Technician on-call contact you right away.



Detailed Burner Performance Sheets

The burner performance data sheet(s) are located on the door of the burner junction panel in a clear tube. Other items that should be found inside the junction panel are:

1. The burner general arrangement which will have the dimensions and overall weight of the burner.
2. The burner specification plaque. It will have the maximum firing rate, fuel pressures, and flow rates listed.
3. The piping and instrumentation (P & I) drawing which is a representation of all the piping and electrical components on the burner. The components which are tagged, for example PI 1-1, will have the Astec part number listed with it. The stainless tags on the components match the P & I drawing. This will allow you to call the Astec Parts Department and obtain an identical part.

If you cannot locate or are missing any of these documents please contact the Astec burner group to obtain a replacement.

Note:

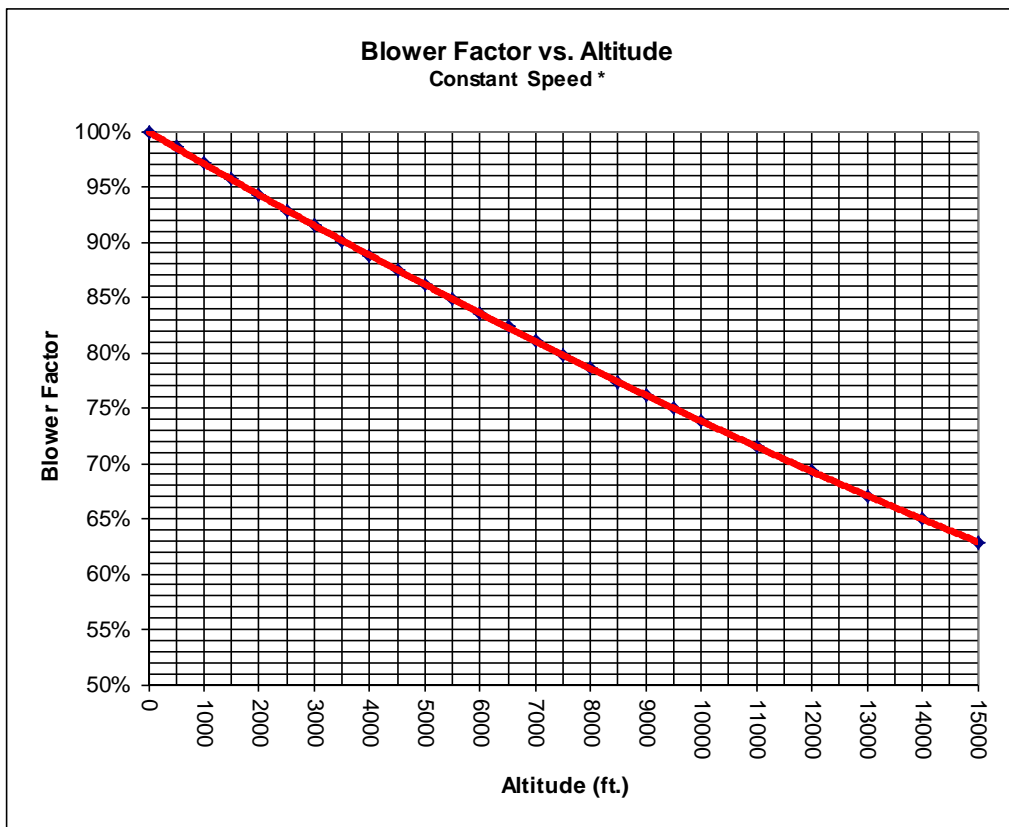
- Should further information be required, or answers to questions not covered generally, or should particular problems arise which are not covered in this manual, contact the Astec Service Department, or the Astec Burner Systems Group
- Whenever any replacement parts are needed, call Astec Parts Department, any time day or night at 1-800-251-6042



Altitude Correction Chart

Blowers at Constant Speed *

Altitude Above Sea Level (ft.)	Air Density lb./ft ³	Blower Correction Factor
0	0.077	100%
500	0.075	99%
1000	0.074	97%
1500	0.073	96%
2000	0.072	94%
2500	0.071	93%
3000	0.070	92%
3500	0.069	90%
4000	0.068	89%
4500	0.067	87%
5000	0.066	86%
5500	0.065	85%
6000	0.064	84%
6500	0.063	82%
7000	0.062	81%
7500	0.061	80%
8000	0.060	79%
8500	0.059	77%
9000	0.058	76%
9500	0.057	75%
10000	0.057	74%
11000	0.055	72%
12000	0.053	69%
13000	0.051	67%
14000	0.050	65%
15000	0.048	63%



For constant speed blowers, blower capacity, power usage and blower pressure are all related linearly to the density of air. To find a burner's performance at altitude, multiply the desired property as determined at sea level by the blower correction factor.

The Phoenix burners uses a variable speed drive. This allows it to have its speed raised to compensate for the lower air density.

For example: A blower using 75 HP at sea level would use $75 \times 0.86 = 64.5$ HP at 5000 ft. Likewise if the blower capacity had been 1,000,000 SCFH at sea level it would be reduced to $1,000,000 \times 0.86 = 860,000$ SCFH at 5000 ft. Additionally if the fan had a static pressure reading of 10 in. H₂O at sea level would be reduced to $10 \times 0.86 = 8.6$ in H₂O at 5000 ft. To compensate for this lower density, the fan speed must be raised above what is listed on the burner profile to obtain the desired static pressure (10 in H₂O) and HP (75). Do not exceed the maximum motor speed or the maximum blower speed, whichever is lower. If you have any questions please contact the burner group for assistance at 423-867-4210.